

REMARKS

Claims Pending

Claims 1-14 are pending in this application. Claims 1, 10, 13 and 14 are independent claims. Claims 2-9 are ultimately dependent from Claim 1 and Claims 11-12 are ultimately dependent from Claim 10. Claims 10-12 are allowed. Claims 2-9 are objected to but indicated as allowable if rewritten in independent form with all of the limitations of the base claim and any intervening claims.

Claims rejected under 35 U.S.C. § 102(b)

Claim 1 was rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,011,434 to Sakai. Claim 1 is believed to patentably define apparatus not anticipated by Sakai for the reasons hereafter set forth.

Briefly stated, in accordance with the present invention, as claimed in Claim 1, there is claimed an amplifier circuit, for providing noiseless amplification of an input signal having a carrier, including a primary amplifier, means for isolating amplifier generated noise, means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal, and means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal. The means for isolating is labeled first circuit means, the means for superpositioning is labeled second circuit means, and

the means for mixing and modulating is labeled third circuit means. The primary amplifier has an input for receiving the input signal and an output for providing an amplified output signal. The first circuit means is connected to the input and the output. The second circuit means is connected to the first circuit means and to the output. The third circuit means is connected to the input and to the first circuit means.

Sakai does not disclose a means for isolating amplifier generated noise. Sakai does not disclose the structure for the means for isolating amplifier generated noise described in the present application or any equivalent structure. The Office Action statement that the variable attenuator 4, variable phase shifter 5 and the divider 7 of Sakai perform the function of isolating amplifier generated noise is error. Sakai does not disclose any structure that performs the function of isolating amplifier generated noise.

In the present application the means for isolating amplifier generated noise, embodied in the first circuit 15, includes the directional first and second couplers 25 and 26, the first and second modulators 27 and 28, the first combiner 29 and the error amplifier 30. The directional first coupler 25 is connected between the input port 12 and the input 21 of the primary amplifier 14. The directional second coupler 26 is connected between the output 22 of the primary amplifier 14 and the output port 13. The first modulator 27 is shown as a variable delay unit and connects to the first coupler 25. The second modulator 28 is shown as a variable attenuator and variable phase

shifter and connects to the second coupler 26. The first combiner 29 connects to the first and second modulators 27 and 28, and the error amplifier 30 connects to the first combiner 29.

The input signal includes a carrier and input noise while the output signal, at the output 22 of the primary amplifier 14, includes the amplified carrier and input noise, and amplifier generated noise. A portion of the input signal is tapped at the first coupler 25 and passed through the first modulator 27 to the first combiner 29 while a portion of the output signal is tapped at the second coupler 26 and passed through the second modulator 28 to the first combiner 29. The first and second modulators 27 and 28 modulate the input and output signals to match that the amplitude, to adjust the phase of the carriers of the input and output signals to be at 180 degrees relative to each other and to match the time delays of the electrical paths, so that the carriers and input noise cancel each other in the first combiner 29, and the output of the first combiner 29 is the amplifier generated noise. The amplifier generated noise is amplified in the error amplifier 30.

In Sakai, the input signal including carrier and input noise, provided from divider 2 and time delayed by delay line 10, is combined in the combiner 11, with the output signal, including the amplified carrier, input noise and pilot signal, and the amplifier generated noise, provided from divider 7. Sakai does not disclose any structure for adjusting or varying the time delay. The device of Sakai does not

match the time delay of the signals provided to the combiner 11, so the device disclosed by Sakai does not cancel the carriers and input noise in combiner 11 to isolate the amplifier generated noise.

Sakai injects a pilot signal before the amplifier 6. Even if the Sakai disclosed structure for matching the amplitude of the signals provided to the combiner 11 or adjusting the phase to be 180 degrees between the signals, Sakai discloses no structure for comparing the pilot signal before amplification and the pilot signal after amplification. The amplifier generated noise introduced by the pilot signal cannot be isolated by the device disclosed in Sakai.

Since Sakai does not disclose a means for isolating amplifier generated noise, Sakai does not disclose a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal connected to a means for isolating amplifier generated noise. Sakai does not disclose a means for mixing the input signal and the amplifier generated noise to produce a first control signal. Since Sakai does not disclose a means for isolating amplifier generated noise, the device of Sakai does not mix the input signal and the amplifier generated noise to produce a first control signal. Since the device of Sakai does not mix input signal and the amplifier generated noise to produce a first control signal, the device of Sakai cannot modulate the input or output signal in response to a first control signal produced by mixing the input signal and the amplifier generated noise. Since Sakai

does not disclose a means for isolating amplifier generated noise, Sakai does not disclose a means for mixing the input signal and the amplifier generated noise connected to a means for isolating amplifier generated noise.

Since Sakai does not disclose all of the elements and definitions of Claim 1, Sakai does not anticipate Claim 1. Since Sakai does not anticipate Claim 1, applicant requests that the rejection of Claim 1 as anticipated by Sakai be withdrawn. Since Sakai does not anticipate Claim 1, applicant requests that the objections to Claims 2-9, ultimately dependent from Claim 1, be withdrawn.

Claims rejected under 35 U.S.C. § 103(a)

Claim 13 was rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 4,230,953 to Wilcox in view of Sakai. Claim 13 is believed to patentably define apparatus not obvious from Wilcox in view of Sakai for the reasons hereafter set forth.

Briefly stated, in accordance with the present invention, as claimed in Claim 13, there is claimed an oscillator circuit including a resonator, a phase modulator connected to the resonator, and an amplifier circuit connected to the resonator and the phase modulator, for providing noiseless amplification of an input signal having a carrier. The amplifier circuit includes a primary amplifier, means for isolating amplifier generated noise, means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal, and means for mixing the input signal and the

amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal. The means for isolating is labeled first circuit means, the means for superpositioning is labeled second circuit means, and the means for mixing and modulating is labeled third circuit means. The primary amplifier has an input for receiving the input signal and an output for providing an amplified output signal. The first circuit means is connected to the input and the output. The second circuit means is connected to the first circuit means and to the output. The third circuit means is connected to the input and to the first circuit means.

Wilcox does not teach or suggest an amplifier circuit with a means for isolating amplifier generated noise, a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal, or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal. Wilcox does not teach or suggest a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal connected to a means for isolating amplifier generated noise or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal connected to a means for isolating amplifier generated noise.

Sakai does not teach or suggest the deficiencies of Wilcox. Sakai does not teach or suggest a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal connected to a means for isolating amplifier generated noise, or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal connected to a means for isolating amplifier generated noise, as set forth above. Since Wilcox and Sakai combined do not teach or suggest all of the elements and limitations of any of Claim 13, applicant requests that the rejection of Claim 13 as unpatentable over Wilcox in view of Sakai be withdrawn.

Claim 14 was rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,850,739 to Higuchi in view of Sakai. Claim 13 is believed to patentably define apparatus not obvious from Higuchi in view of Sakai for the reasons hereafter set forth.

Briefly stated, in accordance with the present invention, as claimed in Claim 14, there is claimed first and second amplifier circuits and a frequency mixer. The first and second amplifier circuits, each for providing noiseless amplification of an input signal having a carrier, each include a primary amplifier, means for isolating amplifier generated noise, means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal, and means for mixing the input signal and the amplifier

generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal. The means for isolating is labeled first circuit means, the means for superpositioning is labeled second circuit means, and the means for mixing and modulating is labeled third circuit means. The primary amplifier has an input for receiving the input signal and an output for providing an amplified output signal. The first circuit means is connected to the input and the output. The second circuit means is connected to the first circuit means and to the output. The third circuit means is connected to the input and to the first circuit means. The frequency mixer is connected to the first and second amplifier circuits and configured to receive and mix the output signals from the first and second amplifier circuits.

Higuchi does not teach or suggest a frequency mixer connected to the first and second amplifier circuits and configured to receive and mix the output signals from the first and second amplifier circuits. The device of Higuchi, as shown in Figure 1, combines the signals from the first and second frequency band low-noise amplifiers 11 and 111, and mixes the combined signal with the signal from the voltage controlled oscillator 15 in first frequency band RX mixer 13. Applicant notes that the detailed description of Higuchi is inconsistent with the Figures, and describes the output signals of the first and second frequency band low-noise amplifiers 11 not being combined, but rather the first and second frequency band low-noise amplifiers 11 being separately connected to first and

second frequency band RX mixers 13 and 113, respectively.

Higuchi does not teach or suggest an amplifier circuit with a means for isolating amplifier generated noise, a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal, or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal. Higuchi does not teach or suggest a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal connected to a means for isolating amplifier generated noise or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating the input or output signal in response to the first control signal connected to a means for isolating amplifier generated noise.

Sakai does not teach or suggest the deficiencies of Higuchi. Sakai does not teach or suggest a frequency mixer connected to the first and second amplifier circuits and configured to receive and mix the output signals from the first and second amplifier circuits. Sakai does not teach or suggest a means for superpositioning the amplifier generated noise onto the output signal to cancel the amplifier generated noise from the output signal connected to a means for isolating amplifier generated noise, or a means for mixing the input signal and the amplifier generated noise to produce a first control signal, and modulating

the input or output signal in response to the first control signal connected to a means for isolating amplifier generated noise, as set forth above. Since Higuchi and Sakai combined do not teach or suggest all of the elements and limitations of any of Claim 14, applicant requests that the rejection of Claim 14 as unpatentable over Higuchi in view of Sakai be withdrawn.

Conclusion

Claims 10-12 are allowed. Reconsideration of Claims 1, 13 and 14 and allowance of Claims 1-9, 13 and 14 is respectfully requested in view of the foregoing remarks. Should any issues remain that would preclude prompt allowance of this application, it is requested that the Examiner contact the undersigned attorney by telephone.

Respectfully submitted,



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